Eidos 4 (6) 2018

A JOURNAL FOR
PHILOSOPHY
OF CULTURE

DOI: 10.26319/6912

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Can a Robot Be Grateful? Beyond Logic, Towards Religion

Abstract:
Philosophy should seriously take into account the presence of computers. Computer enthusiasts point towards a new Pythagoreanism, a far reaching generalization of logical or mathematical views of the world. Most of us try to retain a belief in the permanence of human superiority over robots. To justify this superiority, Gödel's theorem has been invoked, but it can be demonstrated that this is not sufficient. Other attempts are based on the scope and fullness of our perception and feelings. Yet the fact is that more and more can be computer simulated. In order to secure human superiority over robots, reference to the realm of human relations and attitudes seems more promising. Insights provided by philosophy of dialogue can help. They suggest an ultimate extension of the Turing test. In addition, it seems that in order to justify the belief in human superiority one must rely on the individual experiences that indicate a realm that is not merely subjective. It makes sense to call it religious.

Keywords:
Computer science, robot, Gödel's theorem, digitalization, Pythagoreanism, context, Church's Thesis, philosophy of dialogue, gratitude, prayer.

1. Philosophy and Computers

We live in a world filled with computers. They can do more and more. They are changing our world. What does this lead to? There exist enthusiasts, who say that this brings closer a better world due to efficient production of material *goods* and global communication creating a universal net of mutual contacts. At the same time, there

exist pessimists, who say that we are in danger because of efficient production of *material* goods and global communication putting us into a universal net of *non*-mutual surveillance.

I am not trying to argue here for any of these positions. Let me stress, however, that this new reality must not be ignored. I believe that philosophy in our age must take into account the presence of computers and robots in a most serious way. (After all, modern philosophy was affected by modern science, especially by physics after Newton, and biology after Darwin.) One problem that due to computers looks different now than it did before is the issue of the nature of human beings. Can a robot be indistinguishable from us?

Around us there are more and more robots. Most of us, I guess, hope that we are better than them and that we will remain better. But what could this mean? Better – in what sense? After all, robots can be much stronger, faster, and more accurate: their cameras can do better than our vision, their operations run much faster, they can take into account many more elements of the analyzed situation, and so forth. They can recognize our finger prints in a fraction of a second, so much more efficiently than we can. So what makes us better?

If pressed, we would say that, well, their performance may be better but we are better because of our consciousness, self-consciousness, language, and so forth. The common denominator of such answers seems to be: our understanding of the world, in the broadest sense of the term, is better than that of computers/robots. Granted, it is still better. But will it remain so? I hope it will and I hope you hope, too. But why should we?

One general reason could presumably be based on the fact that computers grew on logical grounds and because of that they are merely logical or mathematical constructions. To make this idea more precise, a whole line of argumentation referring to inherent limitations of logic has been developed. Before analyzing this approach (in Section 4) let us see first a reason why mathematization makes it more difficult to retain the belief in our superiority. The ubiquity of digitalization provides an argument that is seemingly against the belief in our superiority over robots.

2. Neopythagoreanism

Since the seventeenth century, the mathematical description of nature has provided a vindication of the Platonic and Pythagorean approaches. Modern science is so mathematized that it points even more strongly in this direction. For modern science the world consists of special mathematical structures. Also space and time are not continuous, so in theory they could be fully described by combinations of numbers, a highly Pythagorean picture.

And nowadays, a new and practical justification of Pythagoreanism has emerged. The digital analysis and computer simulation of reality have provided a direct justification, in some sense, of the Pythagorean thesis that everything is number. The program in a self-driven car can be coded as just one huge number. (To be sure, it must be properly decoded to do the job, but it is still one number that codes the whole ability.)

Computers are unbelievably successful. This leads some philosophers to the vision of the world as a huge computation. Everything, literally every thing, could be a computer, an automaton or a program. Stephen Wolfram, a leader in computerization, has claimed that the entire world is a cellular automaton.[1] It follows that we, humans, are such automatons as well. We would be, essentially, nothing more than computers.

This extreme version of Neopythagoreanism has been called "cybertotalism". I am not saying we should agree to cybertotalism any more than to any totalitarianism. It remains a philosophical faith. We are not forced by sheer mathematical results to believe in the Matrix any more than many people felt forced by "scientific materialism" to believe in Marx. Nevertheless mathematics is extremely successfully utilized to define our world, to

1) See: Stephen Wolfram, *A New Kind of Science* (Champaign, IL: Wolfram Media, 2002).

reduce it to abstract structures understandable to computers. Those structures are all essentially finite: matter, energy and information suffices for any scientific account. In this way science and computers seem to support a new version of naturalism or materialism. However, mathematics, as we know it, involves infinity and this fact has been used to oppose and defeat materialism and naturalism.

3. Mathematical Infinity

Modern mathematics itself seems to involve belief going beyond materialism: a good example is provided by the Axiom of Infinity. It assumes the existence of an infinite set. This assumption is based on nothing but a belief. It was in the nineteenth century, due primarily to Georg Cantor, that the belief in infinite sets and structures spread among researchers and soon dominated twentieth century mathematics. It makes theories fruitful and easier to develop than if our investigations are restricted to finite – albeit arbitrarily large – sets. It seems, however, that this assumption is not necessary for a development of mathematics and the domain of the finite would be enough for practical applications of mathematics. The belief in infinite sets is much like the belief in God.

Traditionally, there was a distinction between actual infinity (rejected by the ancients and pretty much everyone until the nineteenth century) and the potential infinity. Everyone accepted the potential infinity, but even this tame sort of infinity, symbolized by the three dots "…" that we use like in "1,2,3,…," can be questioned. It is deemed too abstract to really exist by, for instance, Brian Rotman, who wrote the book with the telling title *Ad Infinitum… The Ghost in Turing's Machine: Taking God out of Math and Putting the Body Back In*.[2] He argues that even the belief in the uniquely determined potential set of all natural numbers is Platonic. It goes beyond naturalism, and actually represents a vestige of theology.

So could we do without infinity? Could we have a New Math, radically restricted and down to earth? Probably we could, but the fact is that in doing mathematics we actually deal with infinity all the time. And at least since Descartes this fact alone has been used to show our superiority over machines: they are assumed to be unable to handle infinity. Yet this argument is rather weak as it seems just to assume our superiority rather than prove it. There exists, however, a famous attempt, and one most appropriate for computer enthusiasts, that uses mathematics, and more precisely mathematical logic and its celebrated achievement known as Gödel's Theorem, in order to show that we are necessarily different from all possible robots.

4. The Gödelian Argument

The purported argument, using Gödel's theorem, is often associated with the name of John Lucas and more recently with outstanding mathematician/physicist Roger Penrose. Logicians argue against both Lucas who wanted to beat materialism and Penrose who wanted to remain within a more widely conceived naturalism. This logicians' counterargument is not necessarily meant to defend materialism or naturalism. Rather, it shows the insufficiency of the mathematical proof of our superiority over machines, or indeed, as Lucas wanted, of the existence of the soul.

The Gödel based proof of our superiority begins by assuming that a certain theorem-proving machine is equivalent to human mathematical powers, even if only in the realm of elementary arithmetic. Then, the argument goes, the totality of the theorems provable by the machine is either inconsistent, and then not equivalent to us, or consistent, and then we can produce the Gödel sentence for the machine that we can see to be true,

2) See: Brian Rotman, *Ad Infinitum… The Ghost in Turing's machine: Taking God out of Mathematics and Putting the Body Back In* (Stanford, CA: Stanford University Press, 1993). And also his later books.

but, because of Gödel's theorem, it cannot belong to the set of theorems provable by the machine. So, hooray!, we are better than the machine. This means we are not equivalent to any robot. This application of Gödel's metalogical incompleteness theorem has been called "out-Gödeling."

Why is this proof insufficient, indeed wrong? A rather detailed demonstration, extending the arguments formulated by leading logicians, can be found in my other works.[3] Namely, it is possible to prove, mathematically, that assuming one's soundness *and* the systematic use of Gödel's or similar metalogical theorems to show man's superiority over machines, inevitably leads to unsoundness (acceptance of a false statement).[4] The resulting theorem is so general that we can be sure that not just Lucas or Penrose but everyone who tries some systematic version of out-Gödeling necessarily falls into a contradiction. It is ironic that someone who is otherwise consistent (or, to put it more precisely, the set of arithmetical statements he would be ready to accept is consistent) automatically becomes inconsistent as soon as he decides to adopt some such systematic procedure. Thus it can be demonstrated that every kind of argument in the style of Lucas or Penrose must be either circular or lead to an inconsistency.

This was already understood by Gödel. Gödel said that it is not excluded by his results that "there may exist (and even be empirically discoverable) a theorem-proving machine which in fact *is* equivalent to mathematical intuition, but cannot be *proved* to be so, nor even be proved to yield only *correct* theorems of finitary number theory."[5] Gödel's remark can be understood as follows: the existence of a machine, or a robot, equivalent to the human mind as far as mathematical capacities are concerned, is not excluded by his incompleteness theorem alone. This can be illustrated by the hypothetical existence of the robot Luke emerging as a result of an evolution, one equivalent in its mathematical capacity to human mind or, say, Penrose. What then?

First, even if we could meet it, or even talk with it (him or her?), we would not be able to analyze its program and make it perspicuous enough to us to know whether it is consistent. Second, there would be no way to detect the equivalence of the robot Luke with Penrose. A hypothetical supermind could do that, if he could analyze and fully understand human mathematical powers, but the supermind would not be able to demonstrate the equivalence in a way comprehensible to Penrose or to the robot. Third, it would not be excluded that both Penrose and Luke are ultimately inconsistent. And whatever Penrose could declare, Luke could say the same.

Is there a way to save the argument? Yes. The "natural" view of the nature of mathematics, one that Penrose seems to consider as the only admissible one, can serve as an assumption that implies anticompu-

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3) Stanisław Krajewski, "On Gödel's Theorem and Mechanism: Inconsistency or Unsoundness is Unavoidable in Any Attempt to 'Out-Gödel' the Mechanist," *Fundamenta Informaticae* 81, no. 1–3 (2007): 173–181; Stanisław Krajewski, "Penrose's Metalogical Argument is Unsound," in *Road to Reality with Roger Penrose*, ed. James Ladyman, Stuart Presnell, Gordon McCabe, Michał Eckstein, Sebastian J. Szybka (Kraków: Copernicus Center Press, 2015), 87–104; Stanisław Krajewski, *Twierdzenie Gödla i jego interpretacje filozoficzne – od mechanicyzmu do postmodernizmu* (Warszawa: IFiS PAN, 2003).

4) The formal counterargument can be summarized as follows. The Gödel-based argument proving our superiority must respond to every machine that is equivalent to a specifiable Turing machine, or rather, at least, to every consistent machine. Furthermore, we require the response to involve the presentation of an arithmetical sentence not "provable" by the machine, and we assume that this response is effectively determined (otherwise, we would, circularly, assume non-mechanical abilities of the mind). Using Church's Thesis we obtain a partial recursive function F defined for at least consistent machines (i.e., machines whose arithmetical output is consistent) and such that for the nth machine for which $F(n)$ is defined, $F(n)$ is an arithmetical sentence outside the output of the nth machine. The Theorem on Inconsistency states that under those assumptions the set of values of F is inconsistent. (Note that we assume neither that $F(n)$ is produced using Gödel's technique nor that $F(n)$ is true.) A variant related to Penrose's work, the Theorem on Unsoundness, states that if F is defined for (at least) sound machines (ones that prove only true sentences) then the set of values of F is unsound. Loosely put, the former result shows that Lucas is inconsistent, and the latter that Penrose is unsound.

5) Kurt Gödel, "Some Basic Theorems on the Foundations of Mathematics and Their Implications," in *Kurt Gödel: Collected Works*, Volume III, ed. Solomon Feferman et al. (New York, Oxford: Oxford University Press, 1995), 309.

tionalism, or human superiority over robots, when added to Gödel's results. As long as we see mathematical theories, or algorithms, as fundamentally similar to what we know as mathematics, we tend to assume that all the theories that are encompassing our knowledge of the natural numbers must, in principle, be based on a series of transparent basic truths (axioms) and be developed due to the applications of known, correct logical rules. If so, every such theory, if presented to us, must be fully understood, or at least understandable. And this full understanding implies our knowledge of its consistency and presumably also soundness. Therefore, out-Gödeling is, indeed, possible. But without that additional assumption, without this natural view of mathematics, the out-Gödeling does not work.[6]

Despite the above defeat of the Gödelian-style arguments for our superiority Gödel's Theorem does provide a certain indication of our special qualities. It implies that we are unable to state a complete set of axioms, that is, a full definition of (natural) numbers. At the same time, the fact is that we do understand the concept of numbers. This means that we cannot feed a computer with our concept of natural numbers. Something beyond pure, detached reason seems to interfere. We (most of us) are born with capabilities to grasp the meaning of the number concept, but we cannot describe it fully, so that it could be made part of a computer program.

The issue is subtle. Beware: *we* cannot, but it is not excluded by Gödel's result alone that there is a machine, like the robot Luke mentioned above, that can prove exactly the same properties of numbers as we. So: it could not be programmed by us, but it may arise – in principle – in some other way. Perhaps it could arise via evolution?

The metalogical way is insufficient to provide strong grounds for our specificity. We need to look at other approaches to justify our belief in our superiority over robots.

5. Context

In virtually all real life situations context is crucial. To understand what is going on we take into account the background. It is usually standard, and if not we notice it immediately.

Only in some purely mathematical situations is context not important. This can be the case when we take into account everything that constitutes the situation. Pure logic applies when all the elements are explicit. Otherwise we have mathematical models of situations. To use them we need to assume that we consider some of elements of the real situation and the other aspects are deemed irrelevant. For instance, in theoretical mechanics there are material points and forces; when applied to the physical world the bodies are considered as points; this is good enough for many calculations, but not for all considerations.

In every situation we need to decide which elements of the context are relevant, what is essential and what secondary, and so forth. All such decisions require some value judgements. This is the best (I know of) evidence for the interplay of facts and values, against the otherwise attractive idea of their strict separation. And differentiating between the relevant and not relevant aspects is made according to our vision of the world. The vision may be partly implicit, but we need some overall approach that makes the distinguishing possible. This is basically an illustration of the hermeneutical circle: some preunderstanding is needed to understand. In science idealization is necessary. Context is consciously reduced, but its truncation must be constantly monitored. We do that rather easily. Now, can computers do that too?

In human situations context means even more than in science. I would say it is everything. If robots are supposed to act among us they will be handicapped by not being able to detect the appropriate context. Assistant Cortana responded to the voice from a TV set, when the character in the movie said, "find me the

6) This point was presented in: Krajewski, "Penrose's Metalogical Argument is Unsound." .

nearest restaurant." To be sure, the problem of telling the difference between live voice and TV emitted voice can most probably be overcome. I am ready to admit that each specific, properly describable issue of context can probably be somehow incorporated into the program. Can, however, our general ability to take context into account or to ignore it in a meaningful way be simulated by computers? I am not sure. I suspect not. Yet, we should appreciate the fact that so much *can* be simulated. In standard conditions this can work very well: computers find the nearest Japanese restaurant, drive cars, land aircrafts, and so forth. In practice, they take enough context into account. And they will learn much more. Realistically possible contexts will be stored in their memory. So maybe even if our general ability of relating to context cannot be programmed, the difference will one day become practically insignificant. So the issue of context, however central it is, may be insufficient to prove our superiority over robots.

6. Natural Language

It is well known that it is extremely hard to make robots use natural language as we do, that is, to speak and to understand speech the way we do. I think that the most fundamental obstacle is posed by context. Meaning is strongly context dependent. So the issue is pretty much as it was in Section 5 dealing with the problem of context. At the same time, the fact is that computer speech progresses steadily. At some point robots will speak well enough for most normal situations. Maybe not enough for creative, poetic use of language, but who knows – perhaps computers will have their own brand of creativity.

7. Personal Qualities

We, humans, are emotional beings. It is well known that computers lack emotions[7] and this is an important deficiency that computer scientists try to redress. Perhaps an appropriate simulation of emotions can be done, at least to some extent. Then emotions will not be as distinctive as they are now.

There is, however, more to the fullness of human experience than perception and emotions. One human quality, indicated at the beginning of the debate on computers, in the 1972 book *What Computers Can't Do* by Hubert Dreyfus[8], is intentionality. It occurs with some other philosophically motivated items: perceiving gestalt, realizing horizons of meaning. I doubt if computer scientists work on intentionality and other similar faculties. One could argue, however, that we do not need to insert intentionality into a robot, and it can emerge in result of an evolution of machines. But can it? Hilary Putnam, initially a functionalist, adopted later the view that for the functioning of intelligence the whole man is important, not just her "program." And evolution, he said, would not give you "more intentionality than you put into it."[9] Still, one can try to maintain that intentionality is either not real or that it will appear by itself if complexity is high enough. In both cases robots would be able to do as well as us.

There are other human qualities that are difficult to simulate. For instance, imagination or humor. This certainly puts us, with regard to our superiority, on more secure grounds. But can we exclude the prospect of

7) This was understood already half a century ago by Philip K. Dick: he described androids (who became replicants in the 1982 movie *Blade Runner*) as completely similar to humans, only lacking human emotions.

8) Hubert Dreyfus, *What Computers Can't Do: The Limits of Artificial Intelligence* (Cambridge, MA: MIT Press, 1972). See also the extended edition: Hubert Dreyfus, *What Computers Still Can't Do: A Critique of Artificial Reason* (Cambridge, MA: MIT Press, 1992).

9) Hilary Putnam, *Renewing Philosophy* (Boston: Harvard University Press, 1992), 33.

some simulation of those capabilities? And what about the other traditional characteristics, like the consciousness of our mortality, and consciousness as such, and finally, morality? Computer enthusiasts believe that all those qualities will emerge. But the rest of us need not comply. According to a skeptical computer scientist, Jaron Lanier,[10] the belief in computer's consciousness or other such qualities is the present day counterpart to the search for the proofs of God's existence. Actually, the very need to have such proof can be seen as a uniquely human quality. But can we exclude the possibility that one day the development of computers will bring something sufficiently similar to such qualities? Whatever are our predictions in this area, we can, fortunately, look for human specificity in another realm.

8. Relations

We live in society, community. Our mutual dependence is crucial to being human. Not so with robots. To be sure, they function within a network, there can be groups of computers, working as a team. Yet if one computer were powerful enough to do the work of all in the same time, it would be sufficient. Relations do not seem to be essential to individual computers. So is relationality the way to show our superiority?

History of philosophy can be presented *more grammatico*. (I do this after Jacek Filek from Kraków). Ancient philosophy – think about Aristotle – was essentially philosophy in the third person: "it is", "s/he is". This has been continued in the sciences, and also the social sciences. Since Descartes we have the first person philosophy: "I am" is the point of departure. And about 100 years ago the philosophy of dialogue introduced the second person philosophy: "You are" as the point of departure. According to Martin Buber, the I is derived either from the relation "I-it" or from the relation "I-You"; the latter is more fundamental.[11] Identity is dialogical and relation is at the beginning. This dialogical principle developed by Buber and others had had precursors, for example in the work of Ludwig Feuerbach.[12] In a very different way, by reference to logic, it was indicated by Bertrand Russell. According to him, the idealist philosophy is wrong because it conceives the world as consisting of objects with properties; this is not enough since relations cannot be reduced to properties.

Philosophy of dialogue suggests another test of human specificity. The ultimate extension of the Turing test is offered, for example, by me in another work.[13] The Turing test is a famous proposal that uses the operational method of checking whether robots can pretend to be in some respects indistinguishable from human beings. The original test consists in answering questions, or a conversation displayed on a monitor. To extend it, let us refer to the philosophy of dialogue, and try to take into account the insight that the I can emerge only in relations, and that there is no "I" without the irreducible relation "I-Thou".

In addition to human properties that hypothetically can be simulated by robots, we should also consider various possible forms of contact, not just conversation but other patterns as well: joint activity, long term cooperation, and ultimately, living together – whatever that can mean. Let us think in terms of a thought experiment. What is the most intensive, the furthest extended form of contact? It is not completely clear, but it seems that this could mean some long term joint functioning that brings results that can be evaluated; such evaluation must be feasible, and we must try to develop an operational criterion to carry it out. The

10) Jaron Lanier, "One Half a Manifesto," in *The New Humanists: Science at the Edge*, ed. John Brockman (New York: Sterling, 2003).

11) See: Martin Buber, *I and THOU*, trans. Walter Kaufmann (Edinburgh: T. & T. Clark, 1937/1970).

12) A classic presentation is contained in: Martin Buber, "The History of Dialogical Principle," in *Between Man and Man*, trans. Ronald Gregor-Smith (New York and London: Routledge, 1947/2004), 249–264.

13) Stanisław Krajewski, "The Ultimate Strengthening of Turing's Test?" *Semiotica* 188, no. 1/4 (2012): 203–218.

best example of such cooperation may be upbringing, as in bringing up or rearing children. Let us be radical and imagine the most extreme case. It is hard to imagine a more human activity than bringing up children, from birth to adulthood. This would lead us to the seemingly *ultimate* toughening of the Turing test. It is upbringing children *by* robots. That is, robots will pass as humans if they are able to bring up a wo/man from birth (maybe from an artificial womb) to adulthood, resulting in a virtually normal human being. The robots would be allowed to use their programs, interfaces, and manipulating devices, along with all material assets like milk, food, clothing, paper, toys, bicycles, and so forth. The only thing they would be denied is any support by actual humans. (I know how horrible this sounds, but I guess no ethical limitations are imposed on thought experiments!)

If we could not distinguish the normally brought up wo/man from one raised by robots, we would have to admit the possibility of inhumanly (artificially?) formed or stimulated humanity. It would include acquiring all human qualities such as genuine personal subjectivity, the "normal" understanding of numbers (mentioned above), and so forth. A more concrete, operational and quantitative, Turing-style proposal would be: "a more or less normal" human being is one whom an average interlocutor would not discern as a person brought up entirely by robots in the course of, say, an hour-long conversation; and if we want more, in the course of a full day's encounter; and ultimately, in the course of an entire life spent together.

This would be the furthest possible extension of the Turing test. It is, however, so immoral that I hope it will not be implemented in real life. What would we do if those robot-raised individuals were really different? So, where else can we find an indication of our superiority over robots?

9. Personal Experience

There exist human feelings that seem to be very difficult to be simulated on computers. Consider, being ashamed or being grateful. In addition, there exist human attitudes that touch a realm that goes beyond the psychological. For example, hope. Hope can mean hoping for something specific or can be a general, fundamental attitude that points to something that transcends the normal world around us. This indicates the realm of the religious.

The philosophy of dialogue has strong religious overtones. Probably there is no single reason why this is the case, but it is clear that the man-God relation is a primary example of the special irreducible relationship. In addition, the focus on relations opens for us the realm of the ineffable. For Buber, God is "the eternal Thou."[14]

This point can be illustrated by the system of Franz Rosenzweig, the remarkable philosopher of dialogue whose anti-Hegelian message was presented in a rather Hegelian parlance. According to him, there are three *organons*. First, mathematics (science) describing the world; it is always in the past tense. Second, grammar, the dimension seen in addressing someone using her proper name; relating is always in the present tense. Third, prayer – yes, prayer – poetic, and communal (he was Jewish) as an expression of gratefulness and of hope, as well as an anticipation of redemption; all of this must be in the future tense. Clearly, these *organons* are increasingly more difficult for robots to understand.

The very reference to prayer constitutes an argument, of sorts, for our superiority or at least difference. It is hard to imagine a robot praying. Yet the issue is subtle. It is rather easy to make a robot perform the gestures and words proper to specific prayers, and some critics of religion would say that what many people do is of the same character. Robots would not understand the meaning of prayer, but are humans any better? Radical critics might also say that prayer is just an illusion, results from psychological needs, and shows, if anything, an inferiority of humans.

14) See: Buber, *I and THOU*, 75.

Without attempting to discuss the general problem of prayer, I just want to focus on one issue. Prayer can be of different types. An expression of gratefulness is, I believe, its most basic form, and everyone would agree that it is at least one of the most basic forms. We can and should be grateful to other people for innumerable reasons. In addition, one can experience a more fundamental gratitude, one that cannot be made specific. I mean here the feeling that the world is good – compare with the first chapter of Genesis – and the appreciation of the basic fact that I exist. This generalized feeling indicates, I believe on the basis of personal experience, a religious realm. When the religious dimension is not ignored, the defense of human specificity and superiority over robots seems to be more promising, no matter what developments can occur in computer science and robotics.

Clearly, this argument belongs to the category of evidence based on experience but not the standard, normal experience that can be objectively referred to and serve as a universal proof. This makes the above remarks on generalized gratitude – as well as a slightly more elaborate "proof" of God's "existence" based on this experience[15] – not universally acceptable but rather appropriate only to a group, the group consisting of those subjects who relate to the experience. But, it seems to me, there are many such individuals. And no robot belongs to this group, and I guess none ever will.

15) It is presented in the last section of: Stanisław Krajewski, *What I Owe to Interreligious Dialogue and Christianity* (Kraków: The Judaica Foundation, 2017), 71–127.

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